9.0 REASONABLE AND PRUDENT ALTERNATIVE

9.1 OVERVIEW OF THE ALTERNATIVE

This RPA for the FCRPS and for BOR's 19 projects, including the entire Columbia Basin project, identifies actions that, combined with other ongoing and anticipated measures in the Columbia River basin outlined in the Basinwide Recovery Strategy,[1] are likely to ensure a high likelihood of survival with a moderate-to-high likelihood of recovery for each of the listed species. Based on the best available scientific information, the following fundamental components of the RPA would allow the FCRPS to avoid jeopardizing the continued existence of the listed species or adversely modifying their critical habitat.

9.1.1 Performance Standards

The RPA defines certain performance standards that will meet the jeopardy standard described in Section 1.3.1.1 now and as it is fully implemented by 2010. Performance standards for this RPA, described in Section 9.2, are derived from biological requirements of the listed populations as a whole. As the Basinwide Recovery Strategy explains, performance standards are defined at three tiers. At the most general tier are the population-level performance standards. These state the performance needed for the listed population to achieve an adequate likelihood of survival and recovery. Life-stage-specific performance standards at the intermediate tier allocate the performance expectations needed across the life cycle to achieve the population level performance standards. This tier guides the determination of performance standards for particular categories of actions in habitat, harvest, hatcheries, and hydro, at the next level, such as performance standards for hydropower in this RPA. These third-tier standards are applicable to all activities of this type and are intended to achieve the life-stage-specific performance standards.

At the population level, performance will be evaluated in terms of population growth rate, abundance, genetic diversity, life history diversity, and geographic distribution. NMFS will apply these principles to the listed ESUs in the basin through its recovery planning process, which will include developing specific goals and measures for each ESU within 3 years.

Hydrosystem performance standards include specific adult and juvenile survival levels (direct and indirect) expected to result from implementing the best or most intensive actions that NMFS and the Action Agencies agree are biologically and technically feasible and within the authority

[1] NMFS is issuing the "Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy" (hereinafter the Basinwide Recovery Strategy). This document outlines the expected improvements in hydro, habitat, hatcheries, and harvest needed to meet the goals of the ESA at the same time as this biological opinion. The Basinwide Recovery Strategy is a conceptual recovery plan that NMFS intends to use as a guideline for evaluating actions that affect the listed species. Consistency with the Basinwide Recovery Strategy ensures that actions are both avoiding jeopardy and enabling the recovery of listed species.

of the Action Agencies. The Action Agencies are committed to attaining the hydro standards by 2010. Sections 6.1.1, 9.7.1, and Appendix D describe how the hydro performance standards were derived.

Offsite mitigation standards include the implementation of specific measures identified in the Basinwide Recovery Strategy and in Sections 9.6.2, 9.6.3, and 9.6.4. The Action Agencies are committed to implementing the offsite mitigation measures described in these sections. The Basinwide Recovery Strategy describes the level of additional improvements to be attained through actions that address other life stages (including, but not limited to, improvements made through offsite mitigation by the FCRPS Action Agencies).

9.1.2 Hydro Actions

Section 9.6.1 of this RPA describes a set of specific, hydro actions that NMFS has determined, on the basis of available scientific information, will achieve the FCRPS hydro performance standards. Most of the measures are aimed at improving passage survival through FCRPS dams and reservoirs by changing project operations and improving project configuration. The measures include the following:

1. Enhanced spill and spillway improvements to facilitate higher spill levels without exceeding harmful TDG levels

2. Improved flow management

3. Physical improvements to both juvenile and adult fish passage facilities

4. Increased use of barges and less reliance on trucks to transport summer migrants

5. Continuation of spill at collector projects to maximize the survival rate of inriver migrants

As determined through the planning process described in Section 9.4, NMFS may deem other combinations of measures sufficient to meet the performance standards and avoid jeopardy.

9.1.3 Offsite Mitigation Actions

Additional measures call for offsite mitigation, as discussed in Sections 9.6.2, 9.6.3, and 9.6.4. These additional actions are included to improve the productivity of the listed salmon populations beyond what would be possible through hydro actions alone. Even with survival improvements in fish passage at and between dams, significant mortality associated with FCRPS/BOR operations will continue to occur. NMFS, therefore, advises the Action Agencies that additional offsite mitigation for habitat, hatcheries, and harvest is needed to avoid jeopardy.

Action Agency implementation of measures in these other areas will increase the certainty and reliability of attaining the increased survival rate of listed ESUs.

Offsite mitigation provided by the Action Agencies will not preclude the need for improvements in habitat, hatcheries, and harvest by other Federal or Non-Federal parties, nor will it diminish the obligation of these other parties to seek improvements in furtherance of Section 7(a)(1) or Section 7(a)(2). Offsite mitigation is intended to complement, not displace, actions by other entities to address habitat, hatcheries, and harvest. Where there are overlaps between offsite mitigation activities of the Action Agencies and the responsibilities of other Federal and non-Federal entities, costs and implementation responsibilities will be shared and coordinated as appropriate.

9.1.4 Rolling 1- and 5-Year Plans

An annual, multiyear planning process to refine, implement, evaluate, and adjust ongoing efforts is critical to achieving the FCRPS hydro and offsite performance standards within the time frame covered by this biological opinion. This will be accomplished through development and implementation of 1- and 5-year plans to achieve both hydro performance standards and offsite mitigation performance standards. The plans will cover all operations, configuration, research, monitoring, and evaluation actions. The plans will also describe habitat, hatchery and harvest actions to be funded or otherwise carried out by the Action Agencies as offsite mitigation. The RPA allows for revision of the specific measures throughout its term, as long as the Action Agencies make steady progress toward meeting performance standards and remain on track for full attainment of the hydro standards by 2010. The 2003 annual plan will contain a comprehensive assessment of the success of the action agencies in obtaining the funding and authorizations and in further defining and implementing the actions called for in this RPA. NMFS will reinitiate consultation if there is lack of adequate progress at that time or in subsequent reviews. The annual planning process is outlined in Section 9.4.

9.1.5 Comprehensive 3-, 5-, and 8-Year Check-ins

Any assessment of future conditions presents the risk that the actions identified under this RPA will not be adequate to ensure long-term survival of the listed ESUs. To manage that risk, NMFS has included critical monitoring, evaluation, and performance measures, as well as action levels, to trigger additional measures if needed. The region must be prepared to move forward with these alternative measures, given the possibility that onsite and offsite measures will not have the predicted results, or that subsequent information will show the predicted improvements to be inadequate. Section 9.2 describes the performance standards and measures. Section 9.5 describes the steps for review and decision-making regarding the adequacy and effectiveness of the RPA. This RPA calls for annual progress reports; major progress evaluations in 2003, 2005, and 2008; and pursuit of other ways to avoid jeopardy in the future, including possible breaching of dams if necessary.

Another key element of the annual progress evaluations in 5 and 8 years is progress on resolving critical uncertainties. Resolution of critical uncertainties is necessary to assess progress, as described above, and to provide guidance on pending actions.

9.1.6 Monitoring, Evaluation, and Progress Reporting

Monitoring and evaluation is not merely the periodic collection of data. Rather, properly designed monitoring programs will provide data for resolving a wide range of uncertainties, including determining population status, establishing causal relationships between habitat (or other) attributes and population response, and assessing the effectiveness of management actions. The information gained through monitoring programs will be a cornerstone in identifying alternative actions and refining recovery efforts. Such programs are, therefore, critical to the successful implementation of this RPA.

For example, there is considerable uncertainty even in assessing the status of listed ESUs under current conditions. It is quite apparent that extinction risks were high under the baseline conditions that led to their listing, and they appear to remain quite high under current conditions. However, precisely quantifying population trends of wild, listed fish depends on knowing the proportion of observed fish that are hatchery fish spawning naturally, and the relative reproductive success of those fish. This information, particularly the latter point, is largely lacking. As a result, the range of uncertainty associated with NMFS' current estimates of risk is large. Recently many artificial production reforms, designed to reduce negative effects of hatchery production on natural populations while retaining its proven production and potential conservation benefits, have been implemented. An important component of any monitoring program will, therefore, be documenting the results and benefits from these recent and ongoing reforms while resolving population status.

In addition, despite full use of the best science available, substantial uncertainty remains about the effectiveness of measures available to meet the biological requirements of listed ESUs. In hydro, for example, the projected effect of the hydro measures, or of the alternative of breaching dams, depends largely on the degree to which there is delayed mortality associated with juvenile fish passage at those dams, either inriver or with barge transportation, and the degree to which that delayed effect would be mitigated with breaching of any particular dam or dams. The potential for delayed, pre-spawning mortality of adults and for survival effects related to estuary or plume conditions created through water management practices are also highly critical uncertainties. In habitat, critical uncertainties are associated with the feasibility of implementing protective measures in light of the existing institutional frameworks (e.g., addressing in-stream flow needs in over-appropriated streams). Uncertainty also exists concerning the magnitude of the expected biological response to habitat actions that achieve their physical objectives and the time frame for that biological response. In the area of artificial propagation, scientific knowledge regarding the effectiveness of hatchery supplementation as a means of speeding recovery is incomplete, but improving, as is the impact of hatchery supplementation on wild populations. Artificial production measures have proven effective in many cases at alleviating

near-term extinction risks, yet the potential long-term benefits of artificial production as a recovery measure are unclear.

To resolve these uncertainties, specific scientific studies must be undertaken with rigorous monitoring and evaluation, focusing on determining population status and the mechanisms that regulate salmon populations. The results from these studies and monitoring should provide better understanding about the status of the ESUs, about which measures work, and about which measures do not work. NMFS also requires monitoring and evaluation of measures to assess an Action Agency's progress in implementing its RPA and the benefits resulting from the Action Agency's implementation. The RPA establishes a schedule of measures, milestones, standards, and decisions subject to updating and refinement through annual planning, to ensure that this evaluation process is disciplined and rigorous. Progress on resolving these uncertainties will be a primary consideration in the annual and 5-year planning process as well as in the 3-, 5-, and 8-year check-ins. Monitoring and evaluation may lead to revisions in measures the Action Agencies undertake to meet performance standards, or in the performance standards themselves, to ensure that the overall program is sufficient to avoid jeopardy to listed ESUs.

9.1.7 Advance Planning for Breach or Other Additional Actions

NMFS has given significant consideration to the options involving breach of the lower Snake River and possibly other dams. Generally, any action that removes or eliminates a source of adverse effects from the listed species' life cycle increases the odds that survival rates will improve. By reducing the effects of one type of human activity, breaching the four lower Snake River dams would provide more certainty of long-term survival and recovery than would other measures.

This RPA requires Action Agencies to take specific actions under certain circumstances to ensure that alternative approaches are available. Such actions will allow for the possibilities that the hydro and offsite mitigation actions described here will not provide the anticipated survival rate increases, or that subsequent information shows the predicted improvements are inadequate. Although the RPA does not rely on breach of any dams to avoid jeopardy, it does require further development of breach as an option if future conditions warrant it. NMFS recognizes that breach is a major action requiring NEPA compliance, congressional authorization, and appropriations before it can be implemented. The specific actions described in Section 9.6.1.9 will reduce the time needed to seek congressional authorization for breach and will reduce the time needed for possible implementation, thereby avoiding delay should breach become a preferred approach.

9.1.8 Breach Triggers

The RPA establishes a schedule for determining whether to pursue breach as a means of avoiding jeopardy. This schedule addresses possible breach of one or a combination of hydroelectric projects. The schedule provides for a rigorous mid-point review of progress in 2005, another comprehensive review in 2008, and a determination under certain conditions to pursue breach if

NMFS issues a failure report on the RPA following one of these reviews. The mid-point evaluation process is described in Section 9.5.

9.1.9 Independent Peer Review

It is important that the public and the courts have confidence in the Action Agencies' activities and in the science that supports the RPA. Accordingly, NMFS, working through the Regional Forum and the Independent Scientific Advisory Board, will obtain independent scientific review of its 5- and 8-year evaluation reports.

9.1.10 Immediate Actions and Benefits

Because listed Columbia River basin anadromous fish are in such fragile condition, an immediate focus on areas and measures that provide gains within 1 to 10 years is essential.

Section 9.6.1 describes the hydrosystem measures intended to provide these short-term gains. Section 9.7.1 describes the expected effects of those actions on juvenile and adult survival levels. The Action Agencies are committed to implementing the specified hydro measures and/or additional measures as needed to fully attain these system survival levels by 2010.

For offsite mitigation, the discussions of habitat (Section 9.6.2), harvest (Section 9.6.3), and hatcheries (Section 9.6.4) describe early action items designed to produce immediate improvements. For habitat these include restoring tributary flows, screening water diversions, providing passage at obstructions, and securing additional riparian, wetland, floodplain, intertidal, or shallow-water habitats. Short-term gains in hatcheries are expected through implementation of conservation hatchery safety nets and hatchery reform, as explained in Section 9.6.4. Given the status and trends of a number of populations in the upper Columbia River and the Snake River basins, the potential benefits of intervening with artificial production actions may outweigh the risks of such intervention. NMFS will work with the Action Agencies on a method for recognizing and documenting the benefits of these efforts. The offsite action items also allow for a thorough assessment of the overall strategic approach by the mid-point progress reviews.

9.2 PERFORMANCE STANDARDS

The purpose of this RPA is to establish a course of action for FCRPS and BOR operations that avoids both jeopardy to the listed stocks and destruction or adverse modification of critical habitat and, thus, meets the standards of ESA Section 7(a)(2). In this biological opinion, NMFS establishes performance standards and associated performance measures that will be used to evaluate the actions implemented each year and proposed in the 1- and 5-year plans.

The RPA is also a major component of the conceptual recovery plan in the Basinwide Recovery Strategy. The Action Agencies' implementation of the RPA will ensure that the FCRPS avoids jeopardy and adverse modification of critical habitat, because the agencies' actions, when added to the other components of the plan, will enable the survival and recovery of the listed salmon and steelhead species. Performance standards are central to the program and depend on clear objectives, measurable results, and accountability.

Performance standards for the RPA derive from the biological requirements of the listed populations at the life cycle level and at each life stage. As the Basinwide Recovery Strategy explains, performance standards are defined in three tiers. The most general tier is the population level performance standards. They define the performance needed for the listed population to achieve adequate likelihoods of survival and recovery. Life-stage-specific performance standards at the intermediate tier allocate across the life cycle the performance expectations necessary to achieve the population-level standards. This tier guides the development of performance standards for categories of actions in habitat, harvest, hatcheries, and hydropower in this RPA. The third-tier standards are intended to achieve the life-stage standards.

NMFS will apply the performance standards when determining whether implementation of the RPA continues to satisfy ESA standards. Because the action-level performance standards derive from the population-level and life-stage-specific performance standards, NMFS will look at all performance standards when making its determination in years 3, 5, and 8.

9.2.1 Programmatic Performance Standards

In years 3, 5, and 8, NMFS will assess whether the Action Agencies have implemented the program of hydro, habitat, and hatchery improvements and the research, monitoring, and evaluation necessary for continuing assessment described in this biological opinion as required to ensure consistency with ESA. Programmatic performance standards include the actions and the schedule defined in the biological opinion and the annual planning process. Performance is measured by the Action Agencies' success in implementing the actions defined in the RPA and annual plans. Critical actions to be evaluated at the 3-, 5-, and 8-year reviews are further described in Section 9.5 and Appendix F. Progress against this standard will be formalized in

NMFS' review of the annual progress reports prepared by the Action Agencies, in the annual NMFS findings letter, and in comprehensive 3-, 5-, and 8-year evaluations. Further information on the 1- and 5-year planning process can be found in Section 9.4.

9.2.2 Biological Performance Standards

Biological performance standards fall into two categories:

- Standards intended to evaluate the status of the stocks (relevant to the population-level and life-stage-specific performance standards)

- Standards intended to evaluate how effectively the actions produce an expected biological response (most relevant to the performance standards that apply to actions)

Both types of evaluation depend on a robust and comprehensive research, monitoring, and evaluation program. NMFS will assess the development and implementation of this research, monitoring, and evaluation program in years 3, 5, and 8. The standards for evaluating stock status and actions will be used in years 5 and 8, when effects should be discernable.

9.2.2.1 Standards Related to ESU Status

The standards used to evaluate stock status reflect the biological requirements of the ESUs consistent with maintaining a high likelihood of survival and a moderate-to-high likelihood of recovery. Recovery standards will ultimately include measures of abundance, productivity trends, species diversity, and population distribution. While recovery standards are being established, NMFS will assess the likelihood of survival and recovery based on estimates of life-stage survival increases and annual population growth rate (e.g., lambda) for each identifiable population in the ESU, as well as previously defined interim recovery goals (see Table 1.3-1). Lambda is derived from observed population abundance and reflects a stock's current productivity. Thus, it addresses important factors likely to be included in future recovery standards.

Estimates of lambda used in this biological opinion were generated using standard techniques (McClure et al. 2000b). The estimates and techniques will be refined as NMFS adds information and researches critical uncertainties, such as the effectiveness of hatchery spawners in the wild. Section 9.5 describes a process for coordinated review of the scientific literature and selection of appropriate methodologies before the 5- and 8-year reviews.

NMFS recognizes that the lambda estimates express just one of several characteristics of a salmon population that must be examined when judging the health or risks it faces. Other characteristics are abundance, genetic diversity, life history diversity, and geographic distribution. NMFS intends to apply these principles to the listed ESUs in the basin through its

recovery planning process, which will develop specific recovery goals and measures for the ESUs by the 2003 check-in. NMFS expects that the goals may provide a scientific foundation for refining the population-level performance measures. Other estimates of population productivity include recruits per spawner (R/S) and smolt-to-adult returns (SARs). R/S estimates require information on age structure and cannot be applied to as many populations as lambda. Both estimates convey similar information. SAR is a useful measure, but it covers only part of the life cycle, while information on the entire life cycle is necessary to gauge population status.

In the July 27, 2000, Draft Biological Opinion (NMFS 2000b), NMFS proposed two action levels for the 5- and 8-year reviews. A level of 1.1 was considered favorable enough to continue implementation without further review, and a level of 0.95 was considered unfavorable enough by year 8 to receive an automatic failure report. A lambda level of 1.1 or higher means a population will double in 8 years. A lambda value of 0.95 means a population will halve in 14 years. One commenter favored the simplicity and clarity of those thresholds. Others, however, pointed to the difficulty of measuring changes in lambda resulting from the RPA by year 8 and the near certainty that the long-term average would still be below 1.1 by then. That would eliminate any ability of the test to discriminate between success and failure. NMFS agreed with many comments. NMFS was also concerned that using a single absolute threshold would not reflect differences in current population growth rates or in the growth rates needed to meet survival and recovery indicator metrics. For those reasons, NMFS revised the 5- and 8-year tests as described below.

In 2005, updated population growth rates will reflect natural variations in survival and the effect of actions taken in the 1990s, including actions taken under prior biological opinions that are incorporated into the jeopardy analysis of the proposed action in this opinion. The key question to be addressed at the 5-year checkpoint will be whether the population growth rate has improved enough relative to the level estimated in this biological opinion to maintain a high likelihood of achieving the 2008 performance standards. This question will be answered with a four-part comparison of average values. The increase does not have to be statistically significant because NMFS recognizes the high variability of the estimates and the difficulty of establishing statistical significance in only 5 years. The ESUs will not be placed at higher risk due to this simple comparison, because the purpose of the test is to trigger additional conservation measures.

For the 5- and 8-year reviews, this RPA establishes three separate tests related to the annual population growth rate (e.g., lambda)[2] and a fourth test related to abundance.

[2]In this discussion, lambda is used as shorthand for an estimate of the population growth rate. NMFS believes the best available information supports the use of lambda at this time. By referring to lambda, however, NMFS does not mean to exclude alternative measures that could be developed and applied in future analyses. As described above, the check-in process described in Section 9.5 includes a coordinated process for selection of appropriate methods based on scientific development before the 2005 evaluation and again before the 2008 evaluation.

- The first test assesses whether the annual population growth rate (e.g., lambda, or a future metric developed to replace it) is greater in 2005 and in 2008 than the base-period value of lambda today. This test will compare lambda on the date of this biological opinion (i.e., measured from 1980 to 2000)[3] with the value of lambda in 2005 (i.e., measured from 1980 to 2004) and again in 2008 (i.e., measured from 1980 to 2007). In each case, the test is passed if lambda has increased. If the newer value is lower, then additional review and actions will be triggered, as described in Section 9.5.

- The second test is whether, in 2005 and again in 2008, the annual population growth rate is greater than or equal to the projected growth rate based on improvements made and expected from actions taken in the 1995 biological opinion, reductions in harvest that occurred after the base period, and the survival standards in the Mid-Columbia Habitat Conservation Plan.[4] In essence, this test asks whether NMFS is actually seeing the positive results from these actions that have been incorporated into the analysis in this biological opinion. This test will compare the estimated current lambda (roughly 1993 to the present) to the actual measured lambdas in 2005 and again in 2008. If the actual lambda is greater, the test is passed. If it is smaller, then additional review will assess the significance of the time series used in this analysis compared to data from returns that benefitted from actions taken in 1995 and later. This could trigger additional actions, as described in Section 9.5.

- The third test will compare population growth rates in 2005 and 2008 against the rates needed to achieve the recovery metrics described in Section 1.3.1.2.2. The projected lambda will be based on the best available information about the effects actually being realized from hydro improvement and offsite mitigation measures included in this biological opinion and other changes being implemented in accordance with the Basinwide Recovery Strategy. The projections must meet or exceed the lambda necessary to achieve the 48-year recovery criteria, i.e., NMFS must be on track to meet these criteria. If not, additional review and, possibly, additional actions would be triggered, as described in Section 9.5.

[3]The dates defining the various periods are approximate. In almost all cases, 1980 used as a starting date refers to the 1980 brood year. Ending dates vary by species and are intended to mean the most recent year for which adult returns are available at the time of the analysis. Thus 1980 to 1999 may mean the 1980 brood year through 1999 adult returns for one ESU, but 1980 to 1998 for another. Actions taken under the research, monitoring, and evaluation section are expected to improve on the timeliness of adult return information. Likewise, in the second test referred to in this section, the starting date is approximate and may vary by ESU based on the most recent year for which adult returns are available and on the variation in that ESU. The more variable the ESU, the longer the period necessary to produce an estimate of sufficient precision. In general, the methodology described in McClure et al. 2000c, that is the basis of the estimates in this biological opinion, requires at least 11 years to develop an estimate.

[4]Changes in harvest are based on current restrictions. Changes in passage survival at the five Mid-Columbia PUD dams are based on commitments by the PUDs to specific survival objectives for fish passage survival. In the case of the Douglas and Chelan county PUDs, the commitment is expressed in the form of an HCP that accompanies their application for an incidental take permit under ESA Section 10. A draft EIS on these applications is being readied for public comment in December 2000. Grant County has a signed settlement agreement that establishes comparable juvenile survival objectives.

- A fourth test, or true safety net test, will include a simple comparison of stock size (abundance) against current levels. Specifically, the test will compare the annual adult returns of wild fish for each ESU and population against the 5-year geometric mean as of the date of this biological opinion. Two consecutive annual returns below this level will trigger a concern that a critical population threshold may have been crossed. If returns fall short, additional review will include the degree and significance of this failure relative to population status information from recovery planning and other scientific information available at the time of the 5- and 8-year evaluation and could lead to additional actions, as described in Section 9.5.

Table 9.2-1 provides the best estimates of base period, estimated current, and recovery lambda values that will be applied at years 5 and 8. Table 9.2-2 provides the estimates of current abundance that will be applied in years 5 and 8. These tables report estimated values for seven ESUs; an eighth ESU that also depends on this RPA to avoid jeopardy (Snake River sockeye) is not included because there are too few fish to apply this type of quantitative analysis. The other four ESUs are not included because NMFS concluded in Section 8 that factors other than the FCRPS contributed to their decline and now limit their potential for survival and recovery (i.e., they are not jeopardized by the FCRPS due to its relatively small impact).

As recovery plans are completed for these ESUs, the specific spawning aggregations and the target abundance levels will be refined. These conclusions assume that the RPA, as a major component of the Basinwide Recovery Strategy, will improve the estimated current population growth rates. If the expectations of this and prior biological opinions are not realized as expected, additional FCRPS actions, such as preparations for breaching (preconstruction, engineering and design, and development of a socioeconomic mitigation plan) and additional structural or operational measures to improve juvenile or adult passage survival, would be triggered. See Section 9.5.

9.2.2.2 Standards Related to Effectiveness of Hydro and Offsite Actions

The Basinwide Recovery Strategy identifies actions expected to reduce the adverse effects of the environmental baseline and hydro, habitat, hatcheries, and harvest actions enough to allow the listed species to survive and recover. That expectation depends on the effectiveness of the identified actions in benefitting listed fish. The effectiveness of the actions in each sector of activity will require evaluation. Evaluations must be tailored to specific activities, but effectiveness must ultimately result in understanding the change in survival of listed fish in that life stage, which affects the population-level performance. The research, monitoring, and evaluation called for by the Basinwide Recovery Strategy and this biological opinion are intended to address the assessment of effectiveness.

9.2.2.2.1 FCRPS Hydro Performance Standards

Hydro performance standards are quantitative and include a timeline of 10 years for attainment. Hydro standards are defined as the estimated juvenile and adult survival levels throughout the

Table 9.2-1. Median annual population growth rate (lambda) estimated from years beginning in 1980, through most recently available year (1994, 1996, 1997, 1998, or 1999, depending upon stock); the expected lambda given continuation of current survival rates; and the lambda needed to meet recovery objectives as described in Section 1.3. Information obtained from Tables 6.3.1 through 6.3.3, 6.3-6 through 6.3-8, and 6.3-11, as well as A-2 through A-6.

Spawning Aggregation	Base Period Lambda (1980 brood year through the most recent year for which adult returns are available)		Estimated Current Lambda (base period adjusted for 1995 Biological Opinion, more recent harvest restrictions and Mid-Columbia HCP)		Recovery Lambda (growth rate needed to meet recovery objective in 48 years or, absent a recovery objective, 1.0)	
	Low	High	Low	High	Low	High
Snake River Spring/Summer Chinook						
Bear Valley/Elk Creeks	1.02	1.03	1.06	1.09	1.05	1.05
Imnaha River	0.88	0.92	0.92	0.98	1.04	1.04
Johnson Creek	1.01	1.03	1.06	1.10	1.03	1.03
Marsh Creek	0.99	1.00	1.03	1.06	1.07	1.07
Minam River	0.93	1.02	0.98	1.09	1.05	1.05
Poverty Flats	0.99	1.02	1.04	1.09	1.03	1.03
Sulphur Creek	1.04	1.05	1.09	1.12	1.07	1.07
Snake River Fall Chinook						
Aggregate	0.87	0.92	0.93	1.03	1.05	1.05
Upper Columbia River Spring Chinook						
Wenatchee River	0.80	0.92	0.81	0.96	1.06	1.10
Snake River Steelhead						
A-run Aggregate	0.74	0.85	0.78	0.92	>1.00	>1.00
B-run Aggregate	0.74	0.84	0.79	0.89	>1.00	>1.00
Upper Columbia River Steelhead						
Methow River	0.81	0.97	0.86	1.06	1.08	1.08
Mid-Columbia River Steelhead						
Deschutes River Sum	0.77	0.84	0.78	0.85	>1.00	>1.00
Warm Springs NFH	0.91	0.91	0.92	0.92	>1.00	>1.00
Umatilla River Sum	0.90	0.90	0.92	0.93	>1.00	>1.00
Yakima River Sum	1.01	1.04	1.00	1.04	>1.00	>1.00
Columbia River Chum Salmon						
Grays River west fork	1.23	1.23	1.23	1.23	>1.00	>1.00
Grays R mouth to head	0.96	0.96	0.96	0.96	>1.00	>1.00
Hardy Creek	1.05	1.05	1.05	1.05	>1.00	>1.00
Crazy Johnson Creek	1.16	1.16	1.16	1.16	>1.00	>1.00
Hamilton Creek	0.92	0.92	0.92	0.92	>1.00	>1.00
Hamilton Springs	1.11	1.11	1.11	1.11	>1.00	>1.00

Table 9.2-2. Estimates of current abundance by ESU and population for the most recent 5 years for which return data are available. Values in the wild only column will be applied in the 5- and 8-year check-ins.

Spawning Aggregation	5-yr. Geometric Mean Incl. Hatchery Fish	5-yr Geometric Mean Wild Only	Last Year of Mean	Data Type
Snake River Spring/Summer Chinook	8,736	3,469	1999	Dam Count
Bear Valley/Elk Creeks	90	90	1999	Run reconstruction
Imnaha River	215	106	1999	Run reconstruction
Johnson Creek	69	69	1999	Run reconstruction
Marsh Creek	13	13	1999	Run reconstruction
Minam River	113	66	1999	Run reconstruction
Poverty Flats	190	178	1999	Run reconstruction
Sulphur Creek	15	15	1999	Run reconstruction
Snake River Fall Chinook				
Aggregate	566	394	1996	Run reconstruction
Upper Columbia River Spring Chinook				
Entiat River	39	26	1998	Run reconstruction
Methow River	132*	123*	1998	Run reconstruction
Wenatchee River	164	144	1998	Run reconstruction
Snake River Steelhead	71,105	8,683	1998	Dam count
A-run Aggregate	56,210	7,885	1997	Dam count
B-run Aggregate	12,274	1,248	1997	Dam count
Upper Columbia River Steelhead	2,127	703	1996	Dam count
Methow River				
Mid-Columbia River				
Deschutes River Sum	10,824	1,301	1996	Total live count
Warm Springs NFH Sum	164	not avail.	1995	Weir count
Umatilla River Sum	1,811	1,239	1996	Total live count
Yakima River Sum	979	933	1997	Dam count
Columbia River Chum				
Grays River west	33	33	1998	Peak counts
Grays River mouth to head	106	106	1998	Peak counts
Hardy Creek	253	253	1998	Peak counts
Crazy Johnson Creek	168	168	1999	Peak counts
Hamilton Creek	14	14	1998	Peak counts
Hamilton Springs	90	90	1999	Peak counts

*The Methow River spring chinook geometric mean estimate includes wild fish taken as hatchery brood stock for the natural stock supplementation program (1996 to 1998).

FCRPS that are expected to directly or indirectly result from the best or most extensive actions that are biologically feasible and within the authority of the Action Agencies. The hydro standards described in Table 9.2-3 involve uncertainty and annual variation. Assumptions about future survival rates are inherent in any projection of the likelihood of survival and recovery (i.e., a jeopardy analysis). NMFS believes, therefore, that the assumptions on which the analysis is based should be explicit.

Table 9.2-3. FCRPS hydrosystem survival performance rates (%) for affected life stages.

ESU	Adult Survival Rate		Juvenile Survival Rate		
	FCRPS System	Per FCRPS Project[1]	FCRPS Inriver Only		FCRPS Combined[2] (Transport + Inriver + Differential Mortality of Transported Fish)
			System	Per Project[1]	
Chinook Salmon					
SR spring/summer	85.5	98.1	49.6	91.6	57.6
SR fall	74.0	96.3	14.3	78.4	12.7
UCR spring	92.2	98.1	66.4	90.3	66.4
UWR	N/A	N/A	N/A	N/A	N/A
LCR	98.1	98.1	90.7	90.7	90.7
Steelhead					
SR	80.3	97.3	51.6	92.1	50.8
UCR	89.3	97.3	67.7	90.7	67.7
MCR	89.3	97.3	67.7	90.7	67.7
UWR	N/A	N/A	N/A	N/A	N/A
LCR	97.3	97.3	90.8	90.8	90.8
CR chum salmon	N/A	N/A	N/A	N/A	N/A
SR sockeye salmon	88.7	98.5	N/A	N/A	N/A

Source: Adult standards taken from Table 9.7-2. Juvenile standards taken from Table 9.7-1.

[1] Per-project inriver survival rate calculated as the xth root of the system inriver survival rate (where x = number of FCRPS projects encountered). They are provided for illustrative purposes only. They are *NOT* intended to be interpreted as project-specific standards, or to be used in any way to support curtailment of survival improvement measures at an individual project.

[2] Values represent averages over the water years and D values in Table 9.7-1.

In 2005 and again in 2008, NMFS will compare the post-2000 average survival with the average survival estimates in this biological opinion and with the survival improvements expected from RPA measures implemented by 2005 (or 2008). The progress check might consist of a series of two-sample statistical tests on one-sided hypotheses about juvenile survival levels. The tests

would take into account uncertainty in both the 1994-to-1999 and the more recent averages. A first test could check whether the post-2000 estimate of survival was significantly lower than the 1994-to-1999 average, plus RPA improvements. The second test could check whether post-2000 survival was significantly higher than the 1994-to-1999 average. The purposes are to determine whether implemented actions are having the expected effects and to determine whether there is steady progress toward full achievement of the standard by year 10.

Because of the annual variability noted above, particularly in relation to environmental and hydrologic conditions and the limited years in the forthcoming progress evaluation, it may also be necessary to account for conditions that differ between the base period and the assessed period. That is, if conditions during the two periods are dissimilar, factoring may be necessary to ensure that the evaluation truly assesses the progress of actions undertaken and that the results are not masked by ambient conditions (environmental or hydrologic).

9.2.2.2.2 FCRPS Offsite Mitigation Performance Standards

FCRPS offsite mitigation builds on the hydro survival improvements called for in the hydro portion of the RPA, together with ongoing survival improvements from other habitat, hatchery, and harvest measures described in the Basinwide Recovery Strategy. The goal for FCRPS offsite mitigation is to improve fish survival over the life cycle beyond this base to help meet the biological requirements of the ESUs. Implicit in the analysis is the expectation that the combination of planned hydropower, hatchery, habitat, and harvest actions will result in enough survival improvements to meet ESA standards for the listed runs in the Columbia River basin.

Table 9.2-4 presents the estimated additional life-cycle survival improvements needed (relative to the survival and recovery metrics presented in Section 1.3.1.2), after accounting for the hydro survival improvements described above, and for estimated effects of changes in harvest and in passage survival at the Mid-Columbia PUD dams. The figures in the table come from the summary of effects over the full life cycle, presented by ESU in Section 9.7.2. Only ESUs for which NMFS concluded jeopardy are included in this table. SR sockeye are not included, because no quantitative analysis was possible. Additional improvements are also expected from actions taken by other Federal agencies described in the Basinwide Recovery Strategy, but which cannot be quantitatively estimated at this time. These improvements will likely contribute to the needed survival change. Offsite mitigation is expected to make up the remainder.

NMFS has determined that the offsite measures described in this RPA, as enhanced and modified through the 1- and 5-year planning process, and together with the measures identified in the Basinwide Recovery Strategy, are sufficient to achieve the biological requirements of the listed ESUs and, thus, sufficient to avoid jeopardy and adverse modification of critical habitat. This determination is made with full consideration of the additional increments of improvement needed, as reported in Table 9.2-4. However, NMFS determination is ultimately qualitative, informed (to the extent possible) by this standardized quantitative analysis. Due to substantial uncertainties, NMFS' determination is not currently placing a great deal of weight on the

Table 9.2-4. Estimated percentage change (i.e., additional improvement in life-

cycle survival) needed to achieve survival and recovery indicator criteria after implementing the hydro survival improvements in the RPA. (A value of 26, for example, indicates that the egg-to-adult survival rate, or any constituent life-stage survival rate, must be multiplied by a factor of 1.26 to meet the indicator criteria.)

Spawning Aggregation	Needed Survival Change	
	Low	High
Snake River Spring/Summer		
Bear Valley/Elk Creeks	0	0
Imnaha River	26	66
Johnson Creek	0	0
Marsh Creek	0	12
Minam River	0	28
Poverty Flats	0	0
Sulphur Creek	0	5
Snake River Fall Chinook		
Aggregate	0	44
Upper Columbia River Spring		
Wenatchee R.	51	178
Snake River Steelhead		
A-run Aggregate	44	214
B-run Aggregate	92	333
Upper Columbia River Steelhead		
Methow R.	0	110
Mid-Columbia River Steelhead		
Deschutes R Sum	102	226
Warm Springs NFH Sum	36	36
Umatilla R Sum	27	31
Yakima R Sum	0	0
Columbia River Chum Salmon		
Grays R. west fork	0	0
Grays R. mouth to head	18	18
Hardy Creek	0	0
Crazy Johnson Creek	0	0
Hamilton Creek	36	36
Hamilton Springs	0	0

Notes: Low and high estimates are based on a range of assumptions, as described in the text.

The values presented in this table are intended to provide perspective and enable NMFS to make a qualitative judgment regarding the potential to improve the productivity of listed ESUs enough to avoid jeopardy. As discussed in the text accompanying this table, the effects of this uncertainty are particularly significant for SR steelhead and UCR chinook and steelhead.

quantitative analysis that produced these estimates. These uncertainties are thoroughly described

in Sections 6 and 9 of this biological opinion. Of particular importance in considering the values in this table is the uncertainty related to the effects of hatchery fish. In general, the uncertainty between 20% and 80% effectiveness of hatchery spawners in the wild is responsible for much of the range between the low and high values in the table. The other assumption contributing to this uncertainty is the level of improvement in hydro survival between the baseline analysis and the adjustment for the effects of NMFS' 1995 Biological Opinion that are not included in the baseline due to the timing of adult return information. In addition, the applicability of the hatchery effectiveness assumption is questionable in some cases. For SR steelhead, for instance, many of the populations within the ESU are in areas not affected by hatchery fish. For these populations, the adjustment in the productivity of wild fish based on these assumptions may not even apply. However, since the CRI analysis relies on dam count information, these assumptions are applied to the ESU as a whole and probably result in overestimating the amount of additional survival improvement needed to satisfy the survival and recovery metrics for some populations.

NMFS plans to refine the analysis by addressing critical uncertainties and, eventually, by quantitatively defining and apportioning the life-cycle improvement necessary in specific life stages or sectors, including the FCRPS. Part of the additional, unquantifiable survival improvements in the Basinwide Recovery Strategy are expected to result from ongoing and prospective Federal actions in land management, hatchery reform, and estuarine restoration. FCRPS Action Agencies are responsible for the balance of the improvements necessary to ensure an adequate likelihood of survival and recovery to satisfy ESA Section 7 obligations for the listed stocks.

9.2.3 Physical Performance Standards

Physical performance standards supplement and sometimes serve as surrogates for biological performance standards. In the case of hydro actions, for example, some physical targets or goals are directed at measures such as mainstem flow objectives and water quality that are intended to guide water management decisions. These are described with the individual hydro actions in Section 9.6.1.

In the case of tributary habitat, physical standards might include instream flows; the amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity; and habitat access.

The Federal Action Agencies, working with CRI and EDT analysts, have established preliminary hypotheses linking habitat strategies and measures to key habitat attributes. The next steps will be as follows:

- Establish an initial set of performance standards and measures—ecological and management indicators—expressed as desired habitat trends.

- Implement pilot studies designed to test and confirm key assumptions that relate habitat improvements to life-stage survival improvements for listed fish species.

The studies needed to assess the specific ecological and management targets will be integrated into tier 3 of the research, monitoring, and evaluation program described in Section 9.6.5. The studies and the objectives may be refined in the first few years through targeted research, subbasin assessments, and finer-scale analysis. Subbasin assessments will use available tools for evaluating habitat quality and quantity and salmon productivity, including EDT, the Salmon Watershed Enhancement Model, and the CRI analysis. The initial 5-year plan (due on March 31, 2001) must include tests of intermediate-stage (egg-to-parr, parr-to-smolt) survival in selected places to check the effectiveness of habitat actions. The tests must be designed to support assessments at the 5- and 8-year checkpoints described in Section 9.5. They will enable policymakers to evaluate and refine hypotheses, adjust habitat measures, and reach further decisions on the contribution to recovery of habitat protection and restoration. They are high-priority projects for early implementation in fiscal year 2001.

Hatchery performance standards will be incorporated into the hatchery and genetic management plans (HGMPs). Standards will be developed in the following areas and measured over time for results:

- Genetic introgression: Local, within-ESU, broodstock is used in all propagation programs within critical habitat, unless associated with an isolated program. Hatchery broodstocks used in supplementation programs represent the genetic and life-history characteristics of the natural population(s) they are intended to supplement. Non-isolated hatchery programs regularly infuse natural-origin fish into the broodstock, as described in an approved HGMP.

- Hatchery-origin fish straying: For naturally spawning populations in critical habitats, non-ESU hatchery-origin fish do not exceed 5 percent; ESU hatchery-origin fish do not exceed 5 to 30%, unless specified in an HGMP for a conservation propagation program.

- Marking: Hatchery populations are properly marked so as not to mask the status of the natural-origin populations or the capacity and proper functioning of critical habitat.

- Viable and critical population thresholds: Hatchery operations do not appreciably slow a listed population from attaining its viable population abundance. Hatchery operations do not reduce listed populations that are at, or below, critical population abundance.

- Harvest effects: Federal hatchery mitigation fish produced for harvest do not cause subsequent overharvest of listed stocks such that their recovery is appreciably slowed. Harvesting reforms are implemented to maintain and enhance harvest of mitigation fish in consideration of the constrained productivity of listed stocks caused by the FCRPS and other development.

- Hatchery planning: Hatchery goals and objectives, operational protocols, monitoring and evaluation, anticipated effects, and relationship to other critical management and planning processes are fully described in approved HGMPs.

- Research: Scientific knowledge is increasing on the effects of hatchery supplementation and captive broodstock programs on the survival and recovery of natural-origin populations. The quality and survival of hatchery supplementation fish are increasing.

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9.3 SUMMARY OF OFFSITE MITIGATION PROGRAM

Offsite mitigation is used in this biological opinion to mean actions in the areas of habitat, hatcheries, and harvest that are expected to provide biological benefits to the listed stocks. In combination with efforts to reduce hydro mortality, improvements expected from other ongoing Federal actions, and the cumulative effects of state or private activities that are reasonably certain to occur, these actions should be sufficient to allow the FCRPS and BOR operations to meet the jeopardy standard. Offsite enhancement includes only measures that are within the current authorities of the Action Agencies.

Each of the Action Agencies currently has some authority to implement programs to benefit listed stocks that are outside of the scope of hydrosystem operations. BPA has authority pursuant to the Northwest Power Act to protect, mitigate, and enhance fish and wildlife affected by the construction and operation of the FCRPS. BPA implements this authority and fulfills its responsibility through the NWPPC's fish and wildlife program. Measures implemented under the program include actions in the areas of habitat, hatcheries, and, to a more limited extent, harvest. The Corps has existing authorities that provide opportunities for some hatchery and habitat improvements pursuant to the Lower Snake River Compensation Plan, the Columbia River Fish Mitigation Program, and other continuing authorities. The Corps is currently seeking authority to carry out habitat improvement activities in the estuary. BOR is authorized, pursuant to the Reclamation Act of 1902, to provide technical assistance to others to address instream habitat improvements; however, BOR only has authority to fund water acquisition and to supply technical assistance for screening and passage improvements. Additional BOR participation in implementing tributary habitat improvement actions is contingent upon acquiring such authority from Congress or acquiring funds to implement the actions from sources other than BOR appropriations.

The Action Agencies will exercise these authorities to implement offsite mitigation actions outside the operation of the hydrosystem. This will be an important contribution toward achieving the standards for offsite mitigation.

Offsite mitigation measures are identified in the RPA in the areas of habitat (Section 9.6.2), harvest (Section 9.6.3), and hatcheries (Section 9.6.4). These measures are intended to complement, not substitute, for actions on Federal lands by Federal land management agencies or actions in the hatchery and harvest arena by other Federal agencies consistent with the Basinwide Recovery Strategy and related biological opinions. The measures identified as offsite mitigation in this biological opinion are targeted at providing biological benefits for the listed ESUs that are the subject of this consultation and will be credited toward achievement of the offsite mitigation performance standards.

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9.4 DEVELOPMENT AND IMPLEMENTATION OF 1- AND 5-YEAR PLANS

This section outlines an annual process for developing and implementing 1- and 5-year plans to achieve both FCRPS hydro performance and offsite mitigation performance standards. The plans will cover all operations, configuration, research, monitoring, and evaluation actions for the FCRPS. The plans will also describe habitat, hatchery, and harvest actions to be funded or otherwise carried out by the Action Agencies as offsite mitigation. The advance planning process outlined in this section is critical to achieving the FCRPS hydro and offsite performance standards within the time-frame of this biological opinion.

9.4.1 Development and Implementation of the 1- and 5-year Plans

The following action describes in more detail the expectations for the development and implementation of the 1- and 5-year plans.

Action 1: The Action Agencies, coordinating with NMFS and USFWS, shall annually develop 1- and 5-year plans to implement specific measures in hydro, habitat, hatcheries, harvest, research, monitoring, and evaluation needed to meet and evaluate the performance standards contained in this biological opinion.

The annual planning process is expected to provide the following key benefits:

- A comprehensive plan that identifies progress made and actions needed to achieve FCRPS hydro and offsite mitigation performance standards
- Integration of all FCRPS operations, configuration, research, monitoring, and evaluation actions
- Specific actions to be carried out as offsite mitigation for the effects of the FCRPS and how they will be credited
- Priorities to guide regional planning and in-season actions
- A comprehensive plan to support funding requests

To the extent possible, the plans will be coordinated through established local, regional, and Federal processes. USFWS is referenced in this process to ensure coordination on actions that may affect USFWS hatchery and resident species responsibilities. The responsibility for meeting the performance standards in this biological opinion rests, however, with the Action Agencies. NMFS has the responsibility for determining the adequacy of the 1- and 5-year plans. Regional implementation forums that include participation by entities other than the Action Agencies are described in the following sections. The intent of these processes is to ensure the broadest

possible technical and policy input and information from the region's Indian Tribes and state fish and wildlife managers. While consensus on regional issues is a desired outcome of these processes, failure to reach consensus after full and measured discussion, or lack of participation by the other parties, is not intended to indicate a failure to comply with any of the RPAs.

The planning and implementation process described in this section has the following elements:

- The Action Agencies, with assistance from NMFS and USFWS, will develop a 5-year implementation plan that includes FCRPS and offsite mitigation measures. The hydro portion of the initial 5-year plan will include those specific measures in this RPA for hydrosystem operations, configuration, research, monitoring, and evaluation. The offsite mitigation portion will include specific additional measures in habitat, harvest, and hatcheries from this RPA and the Basinwide Recovery Strategy including research, monitoring, and evaluation. These additional measures are the responsibility of the Action Agencies to fund or carry out, and they include measures that would benefit from involvement and/or contribution of the Action Agencies.

- The 5-year plan will focus on the middle to long term, describing the Action Agencies' programs and how they are intended to meet FCRPS and offsite mitigation performance standards. The plan will detail, as specifically as possible, the measures in those programs, together with schedules and budgets. As a long-term planning tool, the 5-year plan will focus on out-year costs of the measures to ensure budgets and budget requests are adequate to carry out planned activities.

- The initial 5-year plan should be completed by March 31, 2001, and annually thereafter by September 1 (or as mutually agreed upon by the Action Agencies, NMFS, and USFWS).

- NMFS encourages coordination with the Columbia River basin's Indian Tribes and state fish and wildlife managers in development of the 1- and 5-year plans in order to gain the full benefit of cooperative adaptive management with the region's scientists.

- The 5-year plan will guide the Action Agencies, NMFS, and USFWS as they participate in various regional planning processes in which they are collectively or individually involved. Examples are the NWPPC's Fish and Wildlife Program prioritization process, Action Agency budget requests, and production discussions within *U.S. v. Oregon* (which do not directly involve the Action Agencies).

- The Action Agencies, with assistance from NMFS and USFWS, will complete a 1-year plan. The 1-year plan will provide the additional project-specific detail needed to implement the first year of the more general 5-year plan. Both new and ongoing activities should be identified. The first 1-year plan will be completed by September 1, 2001, and annually thereafter on a date that is mutually agreed upon by the Action Agencies, NMFS, and USFWS. The 1-year plan will incorporate, to the greatest extent possible, the measures

developed in regional planning and prioritization processes, but the Federal agencies will not necessarily be limited to only measures approved through those processes. Where differences exist, the plan will explain the differences.

- NMFS will review the 1-year plan for consistency with the biological opinion and issue a finding as to whether the plan is adequate.

- The 1- and 5-year plans will be implemented through a variety of processes. The FCRPS hydro action portion of the plans will be implemented through the existing NMFS Regional Implementation Forum process and, where appropriate, the BPA funding process. The offsite mitigation portions of the plans will be implemented through the BPA funding process, Action Agency budget requests, and other processes as appropriate.

- The Action Agencies are expected to participate in good faith in the regional forums and processes in order to seek agreement on the adaptive management steps necessary to avoid jeopardy. They may convene any additional meetings to gain input from affected parties. However, the Regional Implementation Forum will be the principal decision-making forum for issues related to this biological opinion.

- The Action Agencies may wish to develop one comprehensive plan that consolidates other program activities (e.g., the Columbia Basin Fish and Wildlife Program) with those being done for ESA purposes. If the plans are consolidated, the Action Agencies will specifically identify those measures in this RPA that are the responsibility of the Action Agencies to fund or carry out and those offsite mitigation actions they propose to implement to meet the performance standards.

The 1- and 5-year implementation plans and their priorities should consider the following factors:

- The current status of the various ESUs

- Recent data or results of research, monitoring, and evaluation actions

- Feasibility and timing of implementing each measure

- Probability of success for each measure. The 5-year plan should explain how all the actions together contribute to meeting the performance standards.

- State and Tribal plans and input from state and Tribal comanagers

9.4.2 Process for Developing and Implementing Key Elements of the 1- and 5-Year Plans

The following sections define the process of developing and implementing key elements of the 1- and 5-year implementation plans. The major elements of the plan and of the planning process (described in the following subsections) are as follows:

1. Hydrosystem Plan
2. Operations — Water Management Plan
3. Configuration — Capital Investment Plan
4. Water Quality Improvement Plan
5. Operations and Maintenance Plan
6. Offsite Mitigation — Habitat Plan
7. Offsite Mitigation — Hatcheries and Harvest Plans
8. Research, Monitoring, and Evaluation Plan
9. Tribal Coordination on Hydro and Offsite Mitigation Actions
10. Recovery Planning
11. Unanticipated Actions
12. Approval of Plans
13. Annual Progress Reports

9.4.2.1 Hydrosystem Plan

Action 2: The Action Agencies shall coordinate development and implementation of the hydro portion of the 1- and 5-year implementation plans through the Regional Forum, chaired by NMFS.

The hydro portion of the 1-year plan will describe specific actions to be taken in the coming year to achieve the hydrosystem performance standards. It will incorporate and integrate specific measures developed in the water management, capital investment, and water quality improvement plans, described below. Section 9.6.1 of this biological opinion describes objectives and a number of operational and structural measures that will serve as the basis for the initial operations and configuration actions in the hydro portion of the 1- and 5-year plans. Sections 9.6.1 and 9.6.5 also include research, monitoring, evaluation, and planning measures that, when completed, will guide future implementation decisions. The RPA anticipates that these research and planning actions, together with future decisions made through the 1- and 5-year planning process, will amend the RPA measures. NMFS will explicitly define and approve all such amendments in its written findings.

Development and implementation of the hydro portion of the 1- and 5-year plans will be coordinated through the NMFS Regional Implementation Forum, established in the 1995 Biological Opinion and led by the Implementation Team. The goal of this forum is to ensure the

broadest possible technical and policy input in planning, funding, and implementation decisions regarding the operation and configuration of the FCRPS. Consensus should be sought on issues affecting the region to foster cooperation in the adaptive management process and longevity of decisions. However, nothing in the Regional Implementation Forum process is intended to dilute or remove the authority of any agency. Membership on the Implementation Team is open to senior program and policy level personnel from the states, Tribes, and Federal agencies. The teams and subgroups operating under the Implementation Team's guidance are open to Federal, state, and Tribal representatives with technical expertise in hydroelectric operations and/or the effects of hydroelectric operations on fish, particularly on migrating juvenile and adult salmonids and native resident species, and water quality. In particular, the Action Agencies and NMFS have invited and encouraged participation by the four northwest states and Alaska, 13 Columbia River Tribes, CRITFC, USFWS, EPA, NWPPC, the Mid-Columbia PUDs, and Idaho Power Company. All meetings of the NMFS Regional Forum teams are professionally facilitated and are open to the public. Meeting minutes are distributed to members and the public and are available for review at the NMFS Hydro Division in Portland, or on NMFS' Northwest Region home page at www.nwr.noaa.gov/1hydrop/hydroweb/default.html.

The Implementation Team will meet monthly, or otherwise as needed, to oversee the activities and resolve disputes arising through the Technical Management Team, the System Configuration Team, and the Water Quality Team. The Implementation Team and each of the technical teams will regularly review and approve guidelines or procedural rules. Draft guidelines now in place will serve as default rules for the Implementation Team until it can adopt different rules. Copies of the guidelines are also available on the website or may be obtained from the NMFS Hydro Division in Portland, Oregon.

Given the development of the annual planning process, it may be appropriate for the Implementation Team and all technical teams operating under its guidance to review their guidelines, rules of procedure, and meeting structures to ensure that the teams are prepared to address the annual planning process. Further, it is anticipated that new subgroups may be needed to address resident fish and data management issues. Such subgroups are not described in this section, but may be developed through the Regional Forum and the annual planning process.

9.4.2.2 Water Management Plan

Action 3: The Action Agencies, coordinating through the Technical Management Team, shall develop and implement a 1- and 5-year water management plan and in-season action plans for the operation of the FCRPS.

The 1- and 5-year water management plans will define how the FCRPS will be operated to achieve the performance standards. It will also include a prioritized list of research, monitoring, and evaluation needs associated with implementing the annual water management plans. As an advance planning document, the 5-year water management plan will provide clear objectives, evaluation points, decision criteria, and priorities for the objectives. Given these priorities, the

plan will address any significant changes from prior year operating plans. It will specify any criteria being used to begin or end a particular planned operation. The plan should specifically address exceptions for emergencies declared to ensure the reliability of power supply and transmission service. In addition, the annual plan will include consideration of research, monitoring, and evaluation activities that require special operations. The 5-year water management plan must be incorporated into the 1-year plan by September 1 of each year to ensure timely consideration for funding of associated research, monitoring, and evaluation. This is well before runoff projections are available for the coming year. For this reason, the water management plan will have to contain objectives, priorities, and decision criteria for various water conditions.

This timeline for the 1- and 5-year water management plans does not allow for consideration of specific water-year information. Therefore, the Action Agencies will coordinate through the Technical Management Team to prepare more detailed spring/summer and fall/winter action plans that address spring runoff, summer flow augmentation, fall spawning, and winter incubation seasons. The spring/summer plan will be initiated with the January 1 forecast and updated each month as the new forecast information becomes available. The fall/winter plan will be initiated in September using the best currently available long-range hydrologic and oceanographic information and updated as better information becomes available.

Given the emphasis on advance planning, the Technical Management Team may have to meet only biweekly or monthly during the spring and summer migration and fall spawning seasons to advise the Action Agencies on the status of salmonid migrations and spawning activity, and to review dam and reservoir operations for optimal conditions affecting juvenile and adult anadromous salmonids. The water management plan and the more detailed spring/summer and fall/winter plans, together with the provisions of Section 9.6.1.2, will guide the Technical Management Team in-season management process.

NMFS received comments on a number of process issues related to the Technical Management Team, including frequency of meetings, retention of a meaningful role for the state and Tribal participants, and the need for more explicit provisions to deal with power supply and transmission system emergencies such as occurred in the summer of 2000. In general, NMFS believes that refinement of the in-season management process should be carried out through the established Regional Forum rather than specified as part of this biological opinion (such as occurred with the Technical Management Team's development of the September 22, 2000, "Protocols for Emergency Operations in Response to Generation or Transmission Emergencies"). Specific changes that should be considered through that process include assessing the continuing need for weekly meetings once the more detailed in-season action plans contemplated by this action are done, the venue for such meetings (e.g., annual meetings in Idaho and Montana to discuss potential site-specific impacts at key points during the season), and the need for some level of involvement by regional executives to address power supply or transmission system emergencies of exceptional magnitude or duration.

9.4.2.3 Capital Investment Plan

Action 4: The Action Agencies, coordinating through the System Configuration Team, shall annually develop and implement a 1- and 5-year capital investment plan for the configuration of the FCRPS projects.

The capital investment plan will prescribe investment, research, monitoring, evaluation, and O&M actions to achieve the performance standards. As an advance planning tool, the capital investment plan will address specific objectives and priorities for improving fish passage and water quality. Given the objectives and priorities, the plan will define research, development, and implementation of FCRPS facility improvements to improve anadromous fish passage survival. To the extent that any actions require special system or project operations, the implementation dates and operations will be coordinated with the Technical Management Team and the development of the annual water management plan. O&M needs and budgets associated with the capital investment plan will also be developed.

The SCT will meet monthly or as needed to consider the results of scientific and engineering studies and to develop and recommend FCRPS fish facility improvements, including their priority, implementation schedule, and budget needs.

9.4.2.4 Water Quality Plan

Action 5: The Action Agencies, coordinating through the Water Quality Team, shall annually develop a 1- and 5-year water quality plan for operation and configuration measures at FCRPS projects.

Numerous actions throughout the RPA improve fish passage and survival through measures to improve water quality. The water quality improvement plan will describe the objectives, priorities, and decision criteria for these measures and the specific implementation plans. Given these objectives and priorities, the plan will recommend FCRPS facility and operational improvements related to water quality, gas and temperature monitoring needs, and related studies. In developing the water quality improvement plan, the Water Quality Team will integrate and coordinate its recommendations with the annual water management and the capital investment plans.

9.4.2.5 Operation and Maintenance Plan

Action 6: The Corps and BPA, through the annual planning process, shall develop and implement 1- and 5-year operations and maintenance (O&M) plans and budgets that enhance the capability to operate and maintain fish facilities at FCRPS projects for listed salmonid stocks.

In recent years the Corps' O&M program budget for operations and maintenance of fish passage facilities at FCRPS projects has remained static and has not met increased needs. As a result, there is a growing backlog of needed maintenance actions. Enhanced preventive maintenance programs are needed to avoid costly and untimely repairs and to improve facility reliability. New fish passage facilities being installed will create new O&M needs. Other operational needs, such as increased juvenile fish barging, also raise annual O&M budget requirements. To address these needs, the O&M annual budget should reflect the 1- and 5-year plans to be developed by the Corps in coordination with FPOM and approved by the System Configuration Team. The 1- and 5-year plans will be based on the following:

- Development of a fish facilities preventive maintenance program
- Current requirements for updating aging facilities
- Requirements of new facilities scheduled to come on line each year
- Debris-handling needs and techniques
- Current operations and any anticipated changes.

The Corps' resource capability to undertake and implement O&M actions should also be considered.

9.4.2.6 Offsite Mitigation—Habitat Plan

Action 7: The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for habitat measures that provide offsite mitigation.

The habitat portion of the initial 5-year plan will include programs and measures from the Basinwide Recovery Strategy that are the responsibility of the Action Agencies to fund or carry out. The plan will include schedules and costs associated with the habitat programs. The 5-year plan will also include an analysis of how the habitat measures will meet the performance standards established in this biological opinion. The Basinwide Recovery Strategy calls for the creation of a Federal Habitat Team. The Action Agencies should employ this mechanism to integrate offsite mitigation outlined in the initial 5-year plan with other federal habitat programs. Using the 5-year plan as guidance, and in consultation with the Federal Habitat Team, NMFS, USFWS and the Action Agencies will participate in regional planning and prioritization processes, but the Federal agencies will not necessarily be limited to only those measures approved through those processes.

NMFS expects to rely heavily on NWPPC's subbasin planning process for the identification and development of offsite habitat mitigation opportunities. This process capitalizes on the technical

expertise within the fish and wildlife agencies and Tribes and takes into account their management recommendations, includes technical review by the NWPPC's Independent Scientific Review Panel, and involves local communities and the public. The 1-year plan will incorporate, to the greatest extent possible, the measures developed in the regional planning and prioritization processes. The plan will explain any differences between measures contained in the plan and measures developed in other regional processes.

9.4.2.7 Offsite Mitigation—Hatcheries and Harvest Plans

Action 8: The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for hatchery and harvest measures that provide offsite mitigation.

The harvest and hatchery portion of the initial 5-year plan will include those specific measures and programs from the Basinwide Recovery Strategy that are the responsibility of the Action Agencies to fund or carry out. The plan will include schedules and costs associated with the harvest and hatchery programs. The 5-year plan will include an analysis of how the harvest and hatchery measures will meet the performance standards established in this biological opinion. Using the 5-year plan as guidance, NMFS, USFWS, and the Action Agencies will participate in regional planning and prioritization processes. Those processes include, but are not limited to NWPPC's prioritization process, *U.S. v. Oregon* production discussions (NMFS and USFWS; not the Action Agencies), and budget requests.

The 1-year plan will incorporate, to the greatest extent possible, the measures developed in regional planning and prioritization processes, but will not necessarily be limited to actions approved through those processes. The plan will be consistent with any provisions established by *U.S. v. Oregon*. The plan will explain any differences between measures it contains and measures developed in other regional processes.

9.4.2.8 Research, Monitoring, and Evaluation Plan

Action 9: The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5- year plans for research, monitoring, and evaluation to further develop and to determine the effectiveness of the suite of actions in this RPA.

Research, monitoring, and evaluation will provide data for resolving a wide range of uncertainties, including determining population status, establishing causal relationships between habitat (or other) attributes and population response, and assessing the effectiveness of management actions. Progress on resolving these uncertainties will be a primary consideration in the 1- and 5-year planning process as well as in the 5- and 8-year check-ins. Monitoring and evaluation may lead to revisions in measures the Action Agencies undertake to meet performance standards, or in the performance standards themselves, to ensure that the overall program is

sufficient to avoid jeopardy to listed ESUs. Such programs are, therefore, critical to the successful implementation of this RPA.

Section 9.6.5 describes a framework for a comprehensive research, monitoring, and evaluation program. Many specific actions are already identified in that section, but the plan is not limited to those listed. NMFS expects the Action Agencies to start work on the listed actions concurrent with the development of the 1- and 5-year plans.

9.4.2.9 Tribal Coordination on Hydro and Offsite Mitigation Actions

The Action Agencies and NMFS encourage participation by the Tribes and Tribal organizations in all of the Technical Management Team, System Configuration Team, Water Quality Team, and Implementation Team processes, and in regional planning activities such as the CBFWA/NWPPC process where much of the planning for offsite mitigation activities will occur. Such participation will provide abundant opportunities at the technical level to collect, synthesize, and exchange information and to seek consensus on implementing the hydro and offsite mitigation actions identified in the biological opinion. Discussions at the policy level are also important and may occur through direct communications with Tribes or through policy level forums such as the Columbia River Basin Forum.

The Action Agencies, in keeping with their Federal trust responsibilities, will coordinate with and seek the input of appropriate Tribes during their development of the 1- and 5-year plans. The 5-year plan will be subject to NWPPC's public process, providing additional opportunities for input from Tribes, state fish and wildlife managers, and the public before the 1-year plan is drafted.

9.4.2.10 Recovery Planning

Action 10: The Action Agencies shall work with NMFS and others to promptly incorporate the results of recovery planning into annual Fish and Wildlife Program implementation funding, including support for incorporation of the results into the NWPPC's Fish and Wildlife Program.

As portions of recovery plans become final, NMFS and the other Action Agencies will incorporate applicable elements into the progress reviews and the 1- and 5- year plans described in this RPA. If the incorporation of such recovery plan elements could entail major changes in analyses or actions, the Action Agencies may reinitiate consultation with NMFS.

NWPPC recently amended its Fish and Wildlife Program to be implemented through a 3-year rolling provincial review. The NWPPC's intent is to identify and fund all actions in a province for 3-year periods. Provincial reviews will incorporate the findings of subbasin assessments and subbasin plans when they are complete. Ideally, NMFS' recovery plans would be available to

provide quantitative biological goals and spatial and action priorities to guide provincial reviews and subbasin plans toward achieving recovery. However, NMFS' recovery plans will lag behind the first round of provincial reviews. To address this timing problem, NMFS commits to working on provincial reviews and subbasin plans to optimize the Fish and Wildlife Program's ability to meet ESA needs before recovery planning. Responding to recovery plan goals and actions as they emerge may require some midcourse adjustments in areas with previously completed provincial reviews and subbasin plans. When BPA receives its annual fish and wildlife program recommendations from NWPPC, therefore, it should consider consistency with the latest ESA findings and priorities both in new, as well as in completed, provincial reviews in preparing its 1-year funding plans.

9.4.2.11 Unanticipated Actions

***Action 11*:** By September 30, 2001, the Action Agencies shall develop procedures for carrying out actions that could not be anticipated in the planning process, but that are necessary or prudent to achieve the performance standards.

Scientifically sound projects or operational measures of a limited duration and scale may arise that, for a variety of reasons, were not considered during the normal planning processes. Delaying their implementation to conform to those processes might be impractical or inconsistent with information needs associated with the midpoint evaluation process. To address this concern, the Action Agencies will, in collaboration with NMFS and USFWS, develop an expedited process for implementing new or unplanned activities that might result from new findings, that constitute emergency actions, or that present an unforeseen opportunity. Until the Action Agencies develop an explicit process, they will proceed with any necessary and prudent unanticipated actions after adequate informal coordination with and approval by NMFS.

Because the first 1-year plan under this RPA will not be completed until September 2001, a number of early-implementation, high-priority actions may be added to existing plans for fiscal year 2001. This will be particularly important for research, monitoring, and evaluation needed to assess performance standards.

9.4.2.12 Approval of Plans

Action 12: The Action Agencies shall coordinate with NMFS and USFWS in the review of the 1- and 5-year plans to facilitate timely review and approval as part of the annual decision process.

The responsibility for meeting the performance standards in the biological opinion rests with the Action Agencies, based on their implementation of the 1- and 5-year plans. NMFS and USFWS will participate in the development of the 1- and 5-year plans, considering consistency with their biological opinions; adequacy of the level of effort being undertaken in habitat, harvest, hatcheries, and hydro; priority of actions; and progress toward achieving performance standards

or objectives. Within 45 days of receipt of each 1-year plan, NMFS and USFWS will issue a findings letter to the Action Agencies regarding the adequacy of the plan. The letter will address the consistency of the proposed annual plan with the reasonable and prudent alternative of the biological opinion and, if appropriate, recommend needed changes. If NMFS finds the plan to be inadequate, the Action Agencies may proceed with those elements of the plan not identified by NMFS or USFWS as at issue, while discussions continue regarding how to align the plan with the biological opinion.

The plans will be carried forward into the appropriate Federal or regional planning process. The Action Agencies will expedite implementation unless there are technical or feasibility impediments that cannot be reconciled, or appropriations are not forthcoming from Congress.

9.4.2.13 Annual Progress Reports

Action 13: The Action Agencies shall issue annual reports to NMFS and USFWS on progress toward achieving the performance standards set out in this biological opinion, including comprehensive cumulative reviews in years 3, 5, and 8.

As part of the preparation for the annual planning process described in this section, the Action Agencies will prepare progress reports for NMFS' review. These annual progress reports will document the Action Agencies' findings regarding each of the following:

- Compliance by the Action Agencies with the measures and schedules described in this biological opinion and in 1- and 5-year plans, including a thorough discussion of any impediments to full implementation (e.g., lack of necessary authority or appropriation)

- Progress toward meeting the interim and long-term performance standards for hydrosystem improvements and offsite mitigation established pursuant to this biological opinion and any failure to meet such standards

- Projected progress toward full achievement of performance standards through future actions, or through future benefits of ongoing actions, and the risks that such progress will not be achieved

- Lessons learned, new information, and related adjustments made in actions, standards, or monitoring and evaluation, specifically including the following:

    - Results from pilot studies that may confirm or rebut key assumptions regarding the ability of habitat actions identified in this biological opinion and in the Basinwide Recovery Strategy, as necessary to improve life stage survivals of listed fish species

  - Progress towards resolving critical uncertainties including the effectiveness of naturally spawning hatchery fish, delayed mortality associated with transport, and delayed mortality associated with in-river migration

- Current adult returns and population trends

NMFS, working through the Regional Forum and the Independent Scientific Advisory Board, will obtain independent scientific review of its 5-year and 8-year evaluation reports. The progress reports will better enable NMFS and the Action Agencies to assess progress and the possible need for additional measures.

To the extent the actions or programs are not being implemented as described in the RPA, or fall short of meeting performance measures such as needed improvements in hydrosystem survival, the Action Agencies will propose additional measures to address such shortcomings in their annual updates to the 1- and 5-year plans.

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9.5 DESCRIPTION OF MID-POINT EVALUATION PROCESS

9.5.1 Overview

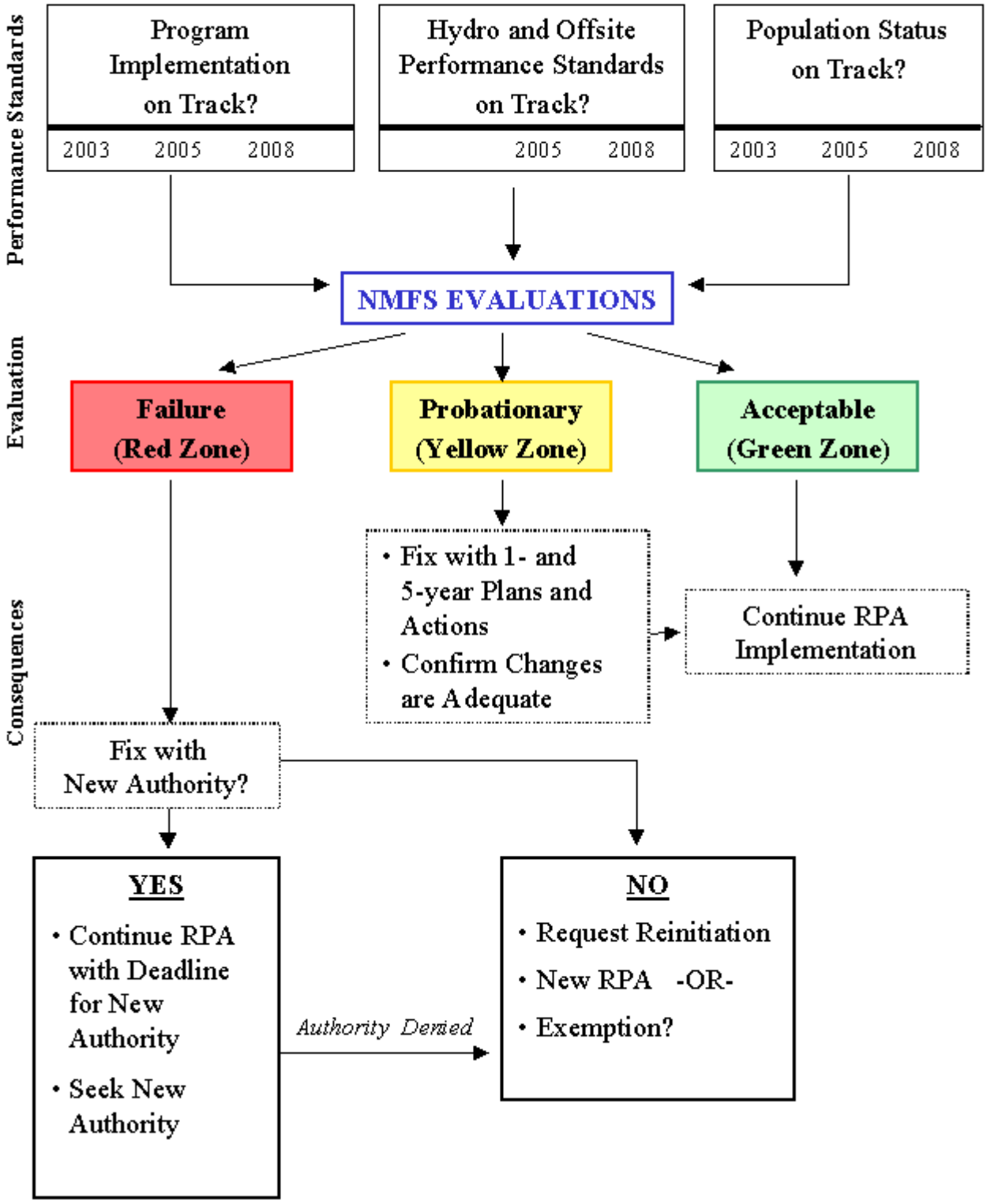
Inclusion of a process to ensure that the required measures are implemented and effective is a critical feature of this RPA. The Action Agencies must be certain that the projects covered by this biological opinion continue to avoid jeopardy and adverse modification of critical habitat for the listed species. At the same time, the Action Agencies must monitor the status of the listed species to ensure that their condition does not worsen unexpectedly despite the actions of this RPA and other conservation measures. These are the purposes of the mid-point evaluation process.

This process overlays the 1- and 5-year planning process discussed in Section 9.4. It incorporates the annual progress reports required for development of 1- and 5-year plans. In years 3, 5, and 8, the agencies perform a more detailed assessment of the RPA's implementation and effectiveness. In years 5 and 8, NMFS will also reevaluate application of the jeopardy/adverse modification standard based on current information, simultaneously reassessing the current status of the listed stocks. NMFS will issue a report at each of these check-in years, documenting whether the RPA is on track or fails to meet expectations. The year 5 and 8 reports, along with the progress reports submitted by the Action Agencies, will be submitted for scientific peer review. Figure 9.5-1 illustrates the timeline for this review process. Figure 9.5-2 provides an overview of the decision structure for the mid-point evaluation process.

NMFS' reports will determine whether, on balance, the Action Agencies' implementation of the RPA is substantially meeting expectations (depicted in Figure 9.5-2 as the green zone). A probationary period (the yellow zone) is provided for implementation that is falling significantly short of expectations. For the RPA to be considered in such a probationary period, NMFS must determine that corrective actions are within the Action Agencies' current authority and can and will be implemented in a timely enough manner to avoid having a significant effect on full implementation of this RPA. If the Action Agencies have critically failed by not taking identified key actions, or if the performance of one or more stocks falls below expectations to the extent that RPA expectations cannot likely be met or confirmed through correction within current authority, NMFS will issue a failure report pursuant to Section 9.5.4 (the red zone).

The following sections describe the mid-point evaluation process.

Figure 9.5-2. Evaluation Flow Chart



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9.5.2 Implementation Progress Check-in 2003

9.5.2.1 Purpose

NMFS' 2003 implementation progress evaluation will focus primarily on the implementation of the RPA measures and, in particular, on the early implementation of hydro, offsite mitigation and research, monitoring, and evaluation measures that are essential to avoid jeopardy and adverse modification of critical habitat. The timely development of performance standards to evaluate the effectiveness of hydro and offsite mitigation measures by 2005 and 2008 is equally essential to ensure that the RPA continues to meet section 7(a)(2) standards. NMFS will consider whether any other new information relevant to species status indicates that the FCRPS/BOR operations are having a materially greater adverse effect than originally assessed and should be considered at this time. NMFS will also determine whether the Basinwide Recovery Strategy is being implemented in a manner likely to be effective, timely, and consistent with its scientific basis.

9.5.2.2 Contents of 2003 Annual Progress Report

In their 2003 annual progress report (due September 1, 2003), the Action Agencies will include a comprehensive and cumulative assessment of their success in implementing the actions called for in this RPA. In addition to the requirements for each annual progress report (as specified in Section 9.4.2.13), the 2003 annual progress report will document the Action Agencies' findings, developed in coordination with Federal agencies, regarding each of the following:

- Whether the Action Agencies have obtained the *funding and authorizations necessary for timely implementation of key actions* identified in this RPA and the annual planning processes and whether those actions are being implemented as expected or in a manner likely to be effective and timely as outlined in this biological opinion. Appendix F provides a summary of the actions, as of the date of this biological opinion, and the specific expectations for this progress check. Key actions are those that 1) are expected to result in near-term survival benefits for the listed stocks, 2) are preparations for implementation of additional survival improvement measures, or 3) are planning, research, and monitoring actions that are important for implementation and evaluation of progress by 2005 and 2008. These expectations are the programmatic standards against which implementation success will, in part, be evaluated. Modification of the list of actions in Appendix F is expected through the 1- and 5- year planning consistent with these criteria above.

- Whether the Action Agencies have initiated *adequate pilot studies, research, and monitoring* projects identified pursuant to Section 9.6.5.3 to confirm or rebut key assumptions. This documentation will include studies of the survival response to habitat actions identified pursuant to the RPA and the Basinwide Recovery Strategy as necessary to improve life-stage survivals of listed fish species.

- Whether *subbasin assessments* have been developed in accordance with Section 9.6.2.1 and *hatchery genetic management plans and safety net planning* have been completed pursuant to Section 9.6.4.2, as well as whether the results of these planning actions have been incorporated into site-specific plans for offsite mitigation.

- Whether the Action Agencies, in coordination with other Federal agencies, have adopted biological performance standards determined by NMFS, based on the best science available, as sufficient 1) to *evaluate the status of each ESU relative to survival and recovery indicator criteria*, using, in particular, ESU-specific recovery standards that incorporate measures of abundance, productivity trends, species diversity, and population distribution and 2) to *evaluate how effectively the actions produce survival improvements* to meet the offsite mitigation performance standard described in Table 9.2-4.

- Whether the Action Agencies have adopted detailed *site-specific, offsite mitigation plans* to meet the offsite mitigation performance standard described in Table 9.2-4, based on completed subbasin assessments, finer scale analyses, and the best available science, are implementing such plans in accordance with their provisions, and have adequate monitoring in place to evaluate their effectiveness.

- Whether the Action Agencies have established *measurable, objective physical performance standards* approved by NMFS based on the best available science to achieve habitat attributes and hatchery reforms through management actions that provide the life cycle survival improvements needed to achieve survival and recovery indicator criteria consistent with Sections 9.2.2.2.2 and 9.2.3.

- Whether the Federal agencies participating in the Federal Caucus (other than the hydro Action Agencies) have obtained the funding and authorizations necessary for the timely implementation of specific *action items identified in the Basinwide Recovery Strategy* and whether those action items are being implemented in a manner likely to be effective, timely, and consistent with the scientific basis for the Basinwide Recovery Strategy. Federal Caucus members will provide this information to NMFS and the Action Agencies as part of the Basinwide Recovery Strategy implementation.

9.5.2.3 NMFS' Evaluation of the 2003 Annual Progress Report

In 2003 NMFS shall evaluate the Action Agencies' implementation of the RPA as of that date based upon the 2003 Annual Progress Report and the best available science. NMFS will prepare an evaluation report in which it shall affirm or reject each of the Action Agencies' findings and present the basis for its evaluation.

NMFS will evaluate the implementation of Section 9.6.1 onsite FCRPS hydro actions, including the expected implementation schedule. NMFS will also evaluate the Action Agencies' success in developing 1- and 5-year plans in 2001, 2002, and 2003 and the implementation, or likely implementation, of the actions identified in those plans. NMFS' evaluation of offsite mitigation plans and description of action implementation will conclude whether or not they have been developed to a level of detail sufficient to evaluate and ensure their effectiveness. For habitat actions, this detail will be accomplished primarily through subbasin assessments and finer scale analyses; for hatchery actions, the details will be developed through hatchery genetic management plans and safety net planning. These planning activities must be completed and the results incorporated into site-specific and ESU-specific plans for offsite mitigation by the 3-year progress check. For both habitat and hatchery actions, the focus will be on early implementation priorities specified in the RPA and initial 5-year plan (due March 31, 2001). For research, monitoring, and evaluation studies, progress must include initiation of research on critical uncertainties and pilot studies to test key assumptions relating habitat improvements to life stage survival improvements for listed fish species. The pilot studies will specifically include focused efforts on intermediate stage survival (e.g., egg-to-parr and parr-to-smolt) in some carefully selected sites to provide an initial check on the effectiveness of habitat actions.

NMFS' report will determine whether, on balance, the Action Agencies' implementation of the RPA is substantially meeting expectations (green zone); not meeting expectations, but capable of timely restoration within current authority (yellow zone); or failing, although possibly rectifiable with additional authority (red zone) (Figure 9.5-2). The report will explain the basis for its determination using the best science available.

If the evaluation report shows that the implementation is neither timely nor sufficient, or is not adequate to address new information about species status, NMFS will determine whether the deficiency can be remedied by actions within current authority (i.e., the yellow zone). If NMFS determines that actions exist, within the full authority and capability of the Action Agencies, that can restore the timely and complete implementation of the RPA to the extent necessary to meet the expectations for the 2005 and 2008 check-in evaluations, then NMFS will indicate how the Action Agencies can revise RPA implementation through new 1- and 5- year plans to meet the hydro and off-site performance standards. For example, the plans could call for further efforts to reduce hydro system mortality.

If NMFS determines that the insufficiency of the Action Agencies' RPA implementation cannot be remedied through changes to the 1- and 5- year plans, NMFS will issue a failure report.

Insufficient implementation of key actions (see Section 9.5.2.2 and Appendix F) would necessarily result in a failure report. NMFS' failure report will identify any actions, in particular those not currently authorized for implementation by the Action Agencies, that NMFS has determined are necessary for the FCRPS and BOR projects to avoid jeopardizing the listed species and adversely modifying their critical habitat. The Action Agencies would then seek and obtain additional authority from congress to ensure that the actions continue to avoid jeopardy and adverse modification of critical habitat. For example, failure to implement enough estuary or tributary habitat improvements for Snake River ESUs could necessitate that the Action Agencies seek authorizations to breach Snake River dams (while continuing efforts to restore estuary and tributary habitat) to ensure that all options are available at the mid-point evaluation in 2005. If such actions exist, NMFS will also determine whether all of the listed salmonid ESUs are likely to survive, while retaining an adequate potential to recover, during the time reasonably necessary to obtain required authority and implement the action(s). If NMFS determines that even those additional actions would be insufficient, it may recommend reinitiation of consultation. The Action Agencies also may reinitiate consultation.

Because only limited, new empirical data and analyses are likely to be available in 2003, NMFS does not anticipate reassessing the jeopardy analysis during this evaluation, nor is a scientific peer review of the evaluation report likely to be warranted.

Failure to implement the RPA may also have consequences for consultations on other Federal agency actions that affect listed species in the Columbia River basin, particularly hatchery management and those actions that may affect the estuarine or tributary habitat of the affected ESUs.

9.5.3 The 2005 Evaluation

9.5.3.1 Purpose

In 2005, as in 2003, NMFS will check on the implementation of the key RPA measures. In this check-in, however, the status of the listed salmonid ESUs and biological and physical performance standards will be of equal importance to implementation actions. NMFS will reevaluate the listed ESUs based on performance standards, new monitoring data, results of research on critical uncertainties, and initial results from pilot studies. NMFS will assess whether the population growth rates are improving relative to the levels estimated in 2000 and whether population abundance levels are consistent with standards established in the RPA (see Section 9.2.2.1).

9.5.3.2 Contents of the 2005 Annual Progress Report

The Action Agencies shall provide the best available scientific information regarding each of the topics required for the 2003 annual progress report and, in particular, will include full and complete information about the issues presented in the subsections below.

9.5.3.2.1 Status of 1- and 5-year plan development and implementation. The Action Agencies shall update the information that was required for the 2003 check-in evaluation (see Section 9.5.2.2). NMFS expects that substantially more information about RPA implementation will be available in 2005. In particular this review will assess the timely and sufficient completion of key actions as prescribed by this RPA.

9.5.3.2.2 Status of the listed stocks. Enough new data shall be provided to allow NMFS to apply the performance standards provided in Section 9.2.2.1, including the abundance, productivity trends, species diversity (genetic and life history diversity), and population distribution for each listed ESU.

9.5.3.2.3 Effectiveness of hydrosystem actions. The Action Agencies shall provide enough information for NMFS to complete a thorough review of the adequacy of hydrosystem actions taken, a revision of juvenile and adult hydrosystem survival estimates, evaluations of delayed mortality of transported fish and inriver migrants, and assessments of the ability to improve juvenile fish passage survival through actions taken under the RPA, e.g., surface bypass development and evaluations of the effectiveness of 24-hour spill. Such evaluations should more clearly define the potential effectiveness of breach, transport, and inriver alternatives. The Action Agencies will document their conclusions as to whether they are making adequate progress to reach full attainment of the hydro performance standard by 2010.

9.5.3.2.4 Effectiveness of off-site mitigation actions. The Action Agencies shall review the offsite actions that have been implemented, list their benefits (specific to each ESU), and assess those offsite actions that are planned for implementation. The Action Agencies will provide enough information to enable NMFS to verify their findings and draw conclusions regarding the following key evaluations:

- Have the Action Agencies demonstrated (through pilot studies, historical data assessments, and implementation monitoring) that proposed actions can increase life stage survivals?

- Are the actions with demonstrated survival improvements being implemented at a scale sufficient to avoid jeopardy for each population and each ESU as appropriate, in light of the effects of all other actions that may affect the relevant population and ESU?

9.5.3.3 NMFS' Evaluation of 2005 Annual Progress Report

In 2005, NMFS will issue its evaluation affirming or rejecting each of the Action Agencies' findings in the annual report described above and will conduct comprehensive evaluations of Action Agency activities (and those of cooperating parties), the results of pilot studies, and the results of research on critical uncertainties. NMFS will also develop a complete reassessment of the status of each ESU, including population growth rates (e.g., lambda), abundance, geographic distribution, genetic diversity, and life history diversity. This reassessment will include a

specific review of performance relative to the survival and recovery indicator criteria. For the 2005 evaluation, the performance standards specified in Section 9.2 must be satisfied for this RPA to be considered successful.

As part of the review, NMFS will incorporate any additional information available through the 2004 returns and, for populations representative of each ESU, will provide the following:

- An updated extinction risk analysis based on estimates of the population growth rates (e.g., lambda) from 1980 to the present and incorporating updated estimates of abundance

- An extinction risk analysis based on estimates of the population growth rates (e.g., lambda) from the most recent year for which adult return data are available, going back a long enough time to make an adequately precise estimate (approximately 10 to 12 years)

- Expected population growth rates, abundance, distribution, and resulting extinction risks based on implementation of the RPA, specifying the effects attributable to offsite mitigation (including pilot studies) and the combined effects of all other actions (e.g., from the Basinwide Recovery Strategy) that may affect the populations

- Estimates of survival gains necessary to achieve recovery/survival indicator criteria

NMFS anticipates that methods of assessing annual population growth rates will have been refined, based on NMFS' research efforts, those of the Action Agencies, or those of independent scientists. In anticipation of this normal progress in scientific methods, NMFS does not now define a specific method by which population growth rate will be determined for its mid-point evaluations. By March 1, 2005, NMFS will choose the most appropriate method(s) to estimate population growth rate from the peer-reviewed literature, based on collaboration with the Action Agencies, USFWS, and the state and Tribal comanagers.

By 2005, the Action Agencies must have implemented the hydro, habitat, and hatchery projects specified in 1- and 5-year plans. In addition, the Action Agencies must have initiated research on critical uncertainties and implemented pilot studies to evaluate offsite mitigation benefits, particularly the kinds of life-stage-specific survival improvements that can be expected from their implementation. Based on best available science, NMFS will calculate expected future population growth rates and conclude whether the expected rates are consistent with the estimated level of improvement needed to achieve the survival and recovery indicator criteria. To do this, NMFS will use the improved information on project effectiveness from the pilot studies and improved information on the extent of implementation from the progress reports and compliance monitoring to estimate life-stage-specific survival improvements for all populations. Physical performance standards will remain important as measures of RPA effectiveness for habitat and hatcheries because of the lag times between these habitat actions and population response.

NMFS' report will document its findings related to all available measures of the status of the ESUs (e.g., abundance, distribution, and diversity), including those developed through the technical recovery team process for recovery planning. As the data available in 2005 may be too preliminary for conclusive analysis, NMFS may also recommend measures to refine its preliminary findings no later than the 2008 evaluation.

If the evaluation report finds the implementation is on track (i.e., in the green zone) then implementation will proceed unchanged. If NMFS' evaluation finds that implementation is neither timely nor sufficient, or if NMFS finds that the status of one or more of the listed species has worsened, it will determine whether the insufficiency falls into the probationary yellow zone. If it does, NMFS will then identify how the Action Agencies can revise their implementation through new 1- and 5-year plans to meet the hydro and offsite performance standards. For example, the plans could call for further efforts to reduce hydro system mortality, such as improved flow and spill. Also, if the Action Agencies have obtained additional authority (such as dam breaching authority [see Section 9.6.1.9]) pursuant to direction from the 2003 check-in, they may rectify the RPA's performance by exercising such authority immediately.

If NMFS determines that the RPA's implementation problems cannot be rectified through actions provided in 1- and 5-year plans, it will issue a failure report. The failure report will identify any actions not currently authorized for implementation by the Action Agencies, but that NMFS determines are consistent with the purposes of the FCRPS, technologically and economically feasible, and required to enable the FCRPS and BOR projects to be most likely to avoid jeopardizing the listed species and adversely modifying their critical habitat. The Action Agencies would have to seek and obtain additional authority from congress to ensure that they could continue to avoid jeopardy and adverse modification of critical habitat. For example, failure to implement enough of the estuary or tributary habitat improvements required for Snake River ESUs could mean that the agencies would have to seek authorizations to breach Snake River dams (while continuing efforts to restore estuary and tributary habitat) to ensure that all options are available at the next evaluation in 2008. If other such actions exist, NMFS would also determine whether all of the listed salmonid ESUs are likely to survive, while retaining an adequate potential to recover, during the time needed to obtain the required authority and to implement the action(s).

If NMFS determines that even those additional actions would be insufficient (red zone), it may recommend reinitiation of consultation. The Action Agencies also may reinitiate consultation.

Failure to implement the RPA may also have consequences for consultations on other Federal agency actions that affect listed species in the Columbia River basin, particularly hatchery management and those actions that may affect the estuarine or tributary habitat of the affected ESUs.

9.5.4 The 2008 Evaluation

9.5.4.1 Purpose

Although RPA implementation will still be important in 2008, achievement of performance standards, including the performance of the listed salmonid ESUs will be of primary concern in the 2008 evaluation. NMFS will reconsider all aspects of the evaluations made in 2003 and 2005, based upon the best scientific data available by 2008. In addition, NMFS will assess the population effects attributable to the measures implemented since 1995, based, in particular, on fish returns since 1995; life-stage survival improvements, including hydro survival improvements; and physical performance standards, especially for habitat and hatchery actions.

9.5.4.2 Contents of the 2008 Annual Progress Report

The Action Agencies will provide, in coordination with NMFS and USFWS, the information, findings, and conclusions for every element required in the 2005 evaluation, representing the best scientific data and analysis available by 2008.

9.5.4.3 NMFS' Evaluation of the 2008 Annual Progress Report

In 2008, NMFS will update and refine the analyses it performed for the 2005 evaluation based on the best science and analysis available by 2008. In addition, NMFS will estimate those conditions and population trends attributable to the significant changes in operations initiated with the 1995 biological opinion. Other measures of the status of the ESUs will also be evaluated, as defined through the recovery planning process. NMFS will issue its evaluation report, affirming or rejecting each of the Action Agencies' findings in the annual report, documenting its findings concerning the success or failure of the Action Agencies' implementation of the RPA. In particular, the 2008 evaluation must conclude that the performance standards specified in Section 9.2 are satisfied for the implementation of this RPA to be considered successful.

NMFS anticipates that methods of assessing annual population growth rates will have been refined, based on NMFS' research efforts, those of the Action Agencies, or those of independent scientists. In anticipation of this normal progress in scientific methods, NMFS does not now define a specific method by which population growth rate will be determined for its mid-point evaluations. By March 1, 2008, NMFS will choose the most appropriate method(s) to estimate population growth rate from the peer-reviewed literature, based on collaboration with the Action Agencies, USFWS, and the state and Tribal comanagers.

By 2008, habitat, hatchery, and hydro projects specified in the 1- and 5-year plans must have been implemented, and pilot studies should continue to validate the kinds of life-stage-specific survival improvements that can be expected from their implementation. Physical performance

standards will remain important due to lag times between these actions and population response. NMFS will have improved information on project effectiveness from the pilot studies and on the extent of implementation from the progress reports and compliance monitoring to estimate life-stage-specific survival improvements for all actions to be credited with such improvements and for all populations. Based on this information, NMFS will calculate expected future population growth rates and conclude whether or not the expected rates are consistent with the level of improvement estimated to be necessary to achieve the survival and recovery indicator criteria.

If NMFS determines that RPA implementation is not timely or sufficient, or if it finds that the status of one or more of the listed species has changed materially for the worse, NMFS will determine whether the RPA implementation can be revised through the 1- and 5-year planning process to meet the hydro and offsite performance standards. If so, the RPA implementation will be considered to be in the yellow zone, as in Figure 9.5-2, above. If the RPA can be restored, NMFS will recommend additional measures to address the changed status of the affected ESU(s) or the effects of inaction upon the ESU(s). For example, the plans could call for further efforts to reduce hydro system mortality, such as improved flow and spill. Also, if the Action Agencies have obtained additional authority, including dam breaching authority, pursuant to direction from the 2003 or 2005 check-ins, they may restore the RPA's performance by exercising such authority immediately.

If NMFS finds that any of the listed salmonid ESUs have failed to perform as expected by 2008 (see Section 9.2), it will conclude that the RPA is in the red zone, unless enough authority has become available for implementation in 2008. If NMFS determines that the RPA implementation cannot be remedied through changes to the 1- and 5-year plans, NMFS will issue a failure report. The failure report will identify any actions not currently authorized for implementation by the Action Agencies, but that NMFS determines are technologically and economically feasible, consistent with the purposes of the FCRPS and necessary to enable the FCRPS and BOR projects to be likely to avoid jeopardizing the listed species and adversely modifying their critical habitat. A failure report from NMFS, identifying such actions, would require the Action Agencies to seek and obtain additional authority from congress to ensure that the agencies continue to avoid jeopardy and adverse modification of critical habitat. For example, failure to implement estuary or tributary habitat improvements required for Snake River ESUs could mean that the agencies would have to seek authorizations to breach Snake River dams (while continuing efforts to restore estuary and tributary habitat). If NMFS determines that even those additional actions would be insufficient, it may recommend reinitiation of consultation. The Action Agencies may also reinitiate consultation.

Failure to implement the RPA may also have consequences for consultations on other Federal agency actions that affect listed species in the Columbia River basin, particularly hatchery management and those actions that may affect the estuarine or tributary habitat of the affected ESUs.

9.5.5 Procedural Options after a Yellow Zone or Red Zone Evaluation Report

At any of the evaluation points, NMFS may conclude that the RPA, as implemented by the Action Agencies, fails, or is in danger of failing, to satisfy the ESA Section 7(a)(2) requirement to avoid jeopardy and adverse modification of critical habitat for any of the listed species affected by the covered actions. In other words, NMFS may determine that the Action Agencies' implementation is in the yellow or red zones (see Figure 9.5-2). At year 3, that conclusion would most likely be based on failure of the Action Agencies to fully implement the actions called for in the RPA and its 1- and 5-year planning process. At years 5 or 8, this conclusion would be based primarily on the results of an updated jeopardy analysis, taking into account the current status of the listed species and the effectiveness of the RPA measures. At the 3-, 5-, or 8-year check-in, in a red zone situation, a determination can be made, under certain conditions, to pursue authority to breach one or more dams or to seek authorization and appropriations for additional actions necessary to address the situation for stocks that would not benefit from dam breaching. The procedures to address this situation are described in the next section.

9.5.5.1 1- and 5-Year Plan Amendments

The RPA is designed to respond to new information within the authority of the Action Agencies. Through the 1- and 5-year planning process, shortfalls in the performance of the RPA measures or adverse changes in the species' status must, at a minimum, be adequately addressed by plan modifications. If, for example, the Action Agencies implement a measure that is not effective, or they are unable to implement an expected measure, the planning process requires them to identify alternative measures, within their full authorities, to provide the necessary survival benefits to the listed species. The annual progress reports and the mid-point evaluations must ensure that such shortfalls are adequately addressed. Similarly, if the status of the stocks changes or is worse than originally assessed, the Action Agencies may identify additional RPA measures in their planning processes to ensure that the RPA will have the expected results. NMFS must ensure that enough scientific basis exists to ensure that the additional RPA measures will produce the results expected. Improvement in stock status that is due primarily to environmental variation, such as improved ocean conditions or high runoff years, will not be a basis for curtailing measures intended to address anthropomorphic factors for decline.

9.5.5.2 Continuance to Obtain Authority or Appropriations

If NMFS finds that the RPA fails to meet ESA Section 7(a)(2) standards despite the Action Agencies' exercise of their current authority, and thus the RPA is in the red zone, NMFS will identify additional actions that would satisfy those standards if implemented by the Action Agencies, even though the Action Agencies lack the necessary authority and/or appropriations. Such actions would likely include the breach of one or more dams for those Snake River stocks that would benefit from such actions. As of the date of this biological opinion, dam breaching may significantly improve the survival of Snake River ESUs and is a potential remedy for a failure to achieve performance standards, due to implementation failure or an adverse change in

stock status, for the Snake River ESUs. Thus, this biological opinion presumes that the Action Agencies would have to seek this additional authority for Snake River ESUs in the red zone. For Mid-Columbia and Upper Columbia ESUs, a comparable remedy may be appropriate, though the state of the science is not as well developed as of the date of this biological opinion. NMFS will make this red zone determination using the best science available at the time.

NMFS must be able to find, using the best science available, that the Action Agencies' continuing implementation of the RPA, as detailed in the 1- and 5-year plans, satisfies ESA Section 7(a)(2) standards for a long-enough time to obtain and exercise the necessary authority and appropriations. This is particularly appropriate for FCRPS and BOR projects because their operation is ongoing and cannot be stopped while new authority is obtained. In this situation, therefore, the Action Agencies may seek the authority and/or appropriations for the necessary measures, within the time specified by NMFS. During this time, they would otherwise continue to implement the RPA. Continued implementation of the RPA would remain essential to the survival of all ESUs in life stages not affected by dam breaching. NMFS' report, prepared in coordination with the Action Agencies, would provide the available scientific and technical data and analysis demonstrating the likely feasibility and effectiveness of the measure. Failure to obtain the requisite authority or appropriation within the specified time period would trigger a reinitiation of this consultation.

9.5.5.3 Reinitiation of Consultation

If NMFS finds that the RPA, as implemented, fails to avoid jeopardy to the listed species or adverse modification of their critical habitat, and neither of the preceding procedural options is available, this consultation must be reinitiated pursuant to Chapter 13 and the consultation regulations at 50 CFR Section 402.16. During a reinitiation of consultation, NMFS would reapply the ESA Section 7(a)(2) standards to the effects of the RPA implemented by the Action Agencies. In a new biological opinion, NMFS would reassess the status of the listed species, taking into account the likelihood of survival and recovery as affected by actions across the life cycle of each listed species. NMFS must conclude whether there is any RPA that avoids jeopardy as defined in 50 CFR Section 402.02. If not, then NMFS would document that, after a good faith, reasonable, and responsible effort, no RPAs could be developed within the authority of the Action Agencies, thereby making the actions covered by this opinion eligible for an ESA exemption.

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